

SCAIS-1702- A-25
B.C.A. I Semester (SEP) Degree Examination
COMPUTER SCIENCE
Discrete Mathematical Structures
Paper : DSC-2AT

Time : 3 Hours

Maximum Marks : 80

Instructions to Candidates:

- 1) All Sections are compulsory.
- 2) Draw neat and labelled diagram wherever necessary.

SECTION - A**(10×2=20)****Answer All of the following questions.**

1.
 - a) What is tautology?
 - b) Define Set? Give an example.
 - c) Mention methods of solving a system of linear equations.
 - d) In Gulbarga city, 8 newspapers and 4 magazines are printed. Shiva wants to subscribe 1 news paper or 1 magazine. How many choices does we have?
 - e) In how many ways, letter SEDAM can be arranged?
 - f) Define recurrence relation.
 - g) Let $A = \{1, 2, 3\}$ and $R = \{(1, 2), (1, 3), (3, 2)\}$. Then, R is a relation on A. Find domain(R).
 - h) What is symmetric relation? Give an example.
 - i) Define Simple graph.
 - j) What is graph coloring.

SECTION - B**(6×5=30)****Answer any Six of the following questions.**

2. Explain negation, conjunction and disjunction with truth table.
3. Discuss any two operations on Sets with an example.
4. How many words with or without meaning can be made from the letters of the word MONDAY assuming that no letter is repeated if:
 - a) 4 Letters are assumed at a time.
 - b) All letters are used at a time.
 - c) All letters are used but first letter is a vowel?

5. Find the value if $n, nP_2 = 12$.
6. Show that $1 + 3 + 5 + \dots + (2n - 1) = n^2$.
7. Explain different ways of representation of relations with an example.
8. What is connected and disconnected graph? Explain with an example.
9. Let G be a planar graph with 10 vertices, 3 components and 9 edges. Find the number of regions in G .

SECTION - C

Answer any Three of the following questions.

(3×10=30)

10. Solve using Cramer's rule.

$$x + y + z = 7$$

$$2x + 3y + 2z = 17$$

$$4x + 9y + z = 37$$

11. Explain the tower of Hanoi problem.
12. Show that the relations R in that R of real numbers, defined as $R = \{(a, b) | a \leq b^2\}$ is neither reflexive, symmetric or transitive.
13. Explain any five different forms of graphs.

NCA2S-3063B-24
B.C.A II Semester (NEP) Degree Examination
COMPUTER SCIENCE
Discrete Mathematical Structures
Paper : BCAC06T

Time : 2 Hours

Maximum Marks : 60

*Instructions to Candidates: Attempt All Sections.***SECTION-A**Answer any FIVE of the following. (5×2=10)

1. a) Define Discrete Mathematics? What are the mathematical concepts in discrete mathematics?
- b) What is Set? Write representation of Sets.
- c) Name the basic counting principles.
- d) What is recurrence relation? Write types of recurrence relations.
- e) State the principle of mathematical induction.
- f) Let $A = \{1, 2, 3, 4\}$ and the relation $[x, y]$ belongs to R if $x < y$ defined on A , the relation is given by $R \{(1, 2), (1, 3), (1, 4), (2, 3), (2, 4), (3, 4)\}$ find Domain and Range.
- g) Define graph? Give an example.

SECTION-BAnswer any FOUR of the following. (4×5=20)

2. Prove that $[p \rightarrow q] \vee [-p \rightarrow q]$ is a tautology.

3. If $A = \begin{bmatrix} 7 & 2 \\ 8 & 6 \\ 9 & -6 \end{bmatrix}$ and $B = \begin{bmatrix} 4 & -7 \\ 3 & 1 \\ -8 & 5 \end{bmatrix}$ Find $A+B$ and $A-B$.

4. How many 3 digits numbers can be formed by using the digits 1 to 9 if no digit is repeated?
5. Calculate $f(7)$ for the recursive sequence $f(x)=2f(x-2)+3$ which has a seed value of $f(3)=11$.
6. Define relations? Explain the different ways of representation of relations with an example.
7. Explain adjacency matrix representation of graph with an example.

SECTION-C

(3×10=30)

Answer any THREE of the following.

8. Explain types of sets with an example.
9. Solve the given recurrence relation $a_n - 8a_{n-1} = 5 \cdot 2^n$.
10. For all $n > 1$. Prove that $1^2 + 2^2 + 3^2 + \dots + n^2 = n(n+1)(2n+1)/2$ using mathematical induction.
11. Find the transitive closure of given relation using Warshall's algorithms $R = \begin{bmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 \\ 1 & 0 & 1 & 0 \end{bmatrix}$
12. A motorist travelling from his place to some other place: there may be many routes, but he chooses the shortest path among them. Consider the following graph.